Homework 1 - IS 605 FUNDAMENTALS OF COMPUTATIONAL MATHEMATICS

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Problem Set 1

(1) Calculate the dot product $u.v$ where $u = [0.5; 0.5]$ *and* $v = [3; -4]$

(2) What are the lengths of u and v? Please note that the mathematical notion of the length of a vector is not the same as a computer science definition.

(3) What is the linear combination: $3u - 2v$?

(4) What is the angle between u and v

Problem Set 2

Set up a system of equations with 3 variables and 3 constraints and solve for x. Please write a function in R that will take two variables (matrix A & constraint vector b) and solve using elimination. Your function should produce the right answer for the system of equations for any 3-variable, 3-equation system. You don't have to worry about degenerate cases and can safely assume that the function will only be tested with a system of equations that has a solution. Please note that you do have to worry about zero pivots, though. Please note that you should not use the built-in function solve to solve this system or use matrix inverses. The approach that you should employ is to construct an Upper Triangular Matrix and then back-substitute to get the solution. Alternatively, you can augment the matrix A with vector b and jointly apply the Gauss Jordan elimination procedure.